

**CLAIMS:**

1. A network switch, comprising:
  - an address resolution table comprising an VLAN identifier (ARL VID) in less significant bits, a MAC address, and an action code, wherein each ARL VID is unique; and
    - a VLAN table for storing information related to frame forwarding, the VLAN table comprising a VLAN identifier (VLAN VID) in more significant bits, a forward map and an un-tag map, wherein the ARL VID is used to access an associated entry in the VLAN table.
2. The network switch of claim 1, wherein a determining component uses the action code to determine a network port to which an incoming frame is sent.
3. The network switch of claim 1, wherein the VLAN table further comprises a table with the VLAN VID that may be any value, a table with at least one forward map which defines membership with a VLAN domain, and a table with at least one un-tag map which controls whether an egress packet is tagged or untagged.
4. The network switch of claim 1, further comprising a converting means wherein upon receiving an incoming frame, the converting means

converts a MAC destination address and less significant bits of a VID from the incoming frame into a 12 bit ARL address which is used to access the address resolution table.

5. The network switch of claim 4, wherein upon receiving an incoming frame, the converting means hashes the MAC destination address and less significant bits of the VID from the incoming frame into a 12 bit ARL address which is used to access the address resolution table.

6. The network switch of claim 4, further comprising a comparing means for comparing the ARL VID and the MAC address in the address resolution table with the MAC destination address and less significant bits of the VID from the incoming frame to determine if there is an ARL hit, and if there is an ARL hit, means for using the action code in the address resolution table to determine at least one egress port to which the incoming frame is sent.

7. The network switch of claim 4, further comprising accessing means for using the less significant bits of the VID of the incoming frame to access the VLAN table and means for comparing the VLAN VID with more significant bits of the VID of the incoming frame, wherein if the VLAN VID is the same as the more significant bits of the VID of the incoming frame, there is a VLAN match.

8. The network switch of claim 7, further comprising a forwarding means for forwarding the incoming frame to at least one indicated egress ports if there is a VLAN match and an ARL hit and if the egress ports indicated by the action code is active in the forward map.

9. The network switch of claim 7, further comprising a forwarding means for using the forward map entry to determine where to forward the incoming frame if there is a VLAN match and there is not ARL hit,.

10. The network switch of claim 7, wherein a forwarding means drops the incoming frame if there is not a VLAN match and there is not an ARL hit.

11. A method for forwarding an incoming frame in a network switch, the method comprising the steps of:

upon receiving an incoming frame, converting a MAC destination address and less significant bits of a VID from the incoming frame into a 12 bit ARL address which is used to access an address resolution table;

comparing an ARL VID and a MAC address from the address resolution table with the MAC destination address and less significant bits of the VID from the incoming frame to determine if there is an ARL hit;

if there is an ARL hit, using an action code from the address resolution table to determine at least one egress port to which the incoming frame is sent;

using the less significant bits of the VID of the incoming frame to access an appropriate entry in a VLAN table;

comparing a VLAN VID from the VLAN table with more significant bits of the VID of the incoming frame, wherein if the VLAN VID is the same as the more significant bits of the VID of the incoming frame, there is a VLAN match; and

forwarding the incoming frame to at least one port based on at least one of the ARL hit and the VLAN hit.

12. The method of claim 11, wherein the step of forwarding the incoming frame further comprises the step of forwarding the incoming frame to at least one indicated egress port if there is a VLAN match and an ARL hit and if the at least one egress port indicated by the action code is active in a forward map in the VLAN table.

13. The method of claim 11, wherein the step of forwarding the incoming frame further comprises the step of using a forward map entry in the VLAN table to determine where to forward the incoming frame if there is a VLAN match and there is not an ARL hit.

14. The method of claim 11, further comprising the step of dropping the incoming frame if there is not a VLAN match and there is not an ARL hit.

15. An apparatus for forwarding an incoming frame in a network switch, the apparatus comprises:

converting means for converting a MAC destination address and less significant bits of a VID from an incoming frame into a 12 bit ARL address which is used to access an address resolution table upon receiving the incoming frame;

comparing means for comparing an ARL VID and a MAC address from the address resolution table with the MAC destination address and less significant bits of the VID from the incoming frame to determine if there is an ARL hit;

if there is an ARL hit, means for using an action code in the address resolution table to determine at least one egress port to which the incoming frame is sent;

means for using the less significant bits of the VID of the incoming frame to access an entry in a VLAN table;

comparing means for comparing a VLAN VID from the VLAN table with more significant bits of the VID of the incoming frame, wherein if the VLAN VID is the same as the more significant bits of the VID of the incoming frame, there is a VLAN match; and

forwarding means for forwarding the incoming frame to at least one port based on at least one of the ARL hit and the VLAN hit.

16. The apparatus of claim 15, wherein the forwarding means further comprises means for forwarding the incoming frame to at least one indicated egress port if there is a VLAN match and an ARL hit and if the at least one egress port indicated by the action code is active in a forward map in the VLAN table.

17. The apparatus of claim 15, wherein the forwarding means further comprises means for forwarding the incoming frame if there is a VLAN match and there is not ARL hit, wherein a forward map entry in the VLAN table is used to determine where to forward the incoming frame.

18. The apparatus of claim 15, further comprising dropping means for dropping the incoming frame if there is not a VLAN match and there is not an ARL hit.